

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)	
)	
Update to Parts 2 and 25 Concerning Non-)	IB Docket No. 16-408
Geostationary, Fixed-Satellite Service Systems)	
and Related Matters)	

To: The Commission

**COMMENTS OF
THE BOEING COMPANY**

The Boeing Company (“Boeing”) provides these comments in support of the Commission’s Further Notice of Proposed Rulemaking (“*FNPRM*”) regarding the removal of the domestic coverage requirements for non-geostationary satellite orbit (“NGSO”) satellite systems operating in the fixed-satellite service (“FSS”).¹

Boeing is an applicant to launch three NGSO FSS satellite systems, two involving the V-band and one involving the Ka-band.² Boeing designed each of its NGSO FSS systems to operate

¹ See Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters, IB Docket No 16-408, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 17-122 (Sept. 27, 2017) (“*FNPRM*”).

² See *The Boeing Company Application for Authority to Launch and Operate a Non-Geostationary Low Earth Orbit Satellite System in the Fixed-Satellite Service (S2966)*, SAT-LOA-20160622-00058 & SAT-AMD-20170301-00030 (filed June 22, 2016); *The Boeing Company, Application for Authority to Launch and Operate a Ka-band Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service and in the Mobile Satellite Service (call sign S2977)*, SAT-LOA-20161115-00109 (filed Nov. 15, 2016); *The Boeing Company, Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service (call sign S2993)*, IBFS File No. SAT-LOA-20170301-00028 (filed March 1, 2017). Boeing also has pending before the Commission an application to transfer two of its NGSO FSS applications to SOM1101, LLC, a company controlled by Greg Wyler, so that SOM1101 would serve as the licensee and Boeing would remain available to provide manufacturing and advisory service as needed. Boeing continues to seek a license for its third NGSO FSS system in order to use V-band spectrum to provide innovative broadband services on a global basis.

in compliance with the Commission's domestic geographic coverage rules. Nevertheless, Boeing believes it would serve the public interest for the Commission to withdraw its domestic geographic coverage requirements in order to give NGSO FSS system operators additional flexibility to better serve a greater range of consumers and business objectives.

The Commission's existing geographic coverage rules require NGSO FSS systems to provide continuous coverage to all fifty states, Puerto Rico and the U.S. Virgin Islands.³ A significant factor in this requirement is providing service as far north as Barrows, Alaska at 71 degrees north latitude. For NGSO FSS networks using polar or near-polar orbits (*i.e.*, an orbital inclination of 70 to 90 degrees), serving Barrows is easy. When a polar orbit is used, every NGSO satellite transits over the north pole, providing vastly more capacity to this region than could ever be consumed by its residents, be they scientists, explorers, or holiday icons.

The use of a polar or near-polar orbit, however, involves significant tradeoffs that can impair the provision of broadband services to other regions, particularly the equatorial region where the broadband digital divide is severe. Using a polar orbit, the spacing between each orbital plane in an NGSO constellation is most significant at the equator, reducing the number of satellites available to serve each location and, with it, the overall capacity of the NGSO system in equatorial locations. This problem is further aggravated because NGSO FSS systems often require increased satellite capacity to overcome additional rain fade near the equator.

For some NGSO FSS system designers, the solution is to use significantly lower orbital inclinations (often ranging from 30 to 55 degrees) to increase the number of satellites available to serve both equatorial regions and the most heavily populated regions of the world. Such

³ See *FNPRM*, ¶ 74; see also 47 CFR §§ 25.145(c)(2), 25.146(i)(1), 25.217(b)(1).

constellations can provide improved coverage of Hawaii, Puerto Rico, and the U.S. Virgin Islands, albeit with potentially less coverage of northern Alaska.

The choice of orbital altitude is also a significant factor for an NGSO FSS system in determining its compliance with the Commission's geographic coverage requirements. When operating at an orbital inclination of below 55 degrees, NGSO FSS systems can provide better coverage of northern latitudes using a medium Earth orbit or highly elliptical orbit as compared to an NGSO FSS system operating in low Earth orbit ("LEO"). At the same time, many NGSO FSS system operators seek to use LEO constellations to reduce latency and for other operational advantages.

The Commission should withdraw its domestic geographic coverage rules to give NGSO FSS system operators the flexibility to make such design choices in order to optimize their services to their intended customers. The Commission should not be concerned that such flexibility may prompt all NGSO FSS system operators to refrain from serving very northern latitudes. Significant technical justifications and business reasons will remain as incentives for some NGSO FSS system operators to employ polar and near-polar orbits, as evidenced by the number of existing and proposed NGSO FSS systems that incorporate polar orbits in their constellations. For example, polar orbits can support NGSO FSS systems serving the energy, shipping, and aviation industries, all of which are increasing operations in very northern latitudes.

Likewise, business models and needs also exist to optimize coverage for lower-latitude and equatorial users, including global demand emerging in the Middle East, Southeast Asia, South America and Africa. NGSO FSS system operators should be given the flexibility to optimize the capabilities of their constellations to serve populations in all regions, which can often provide significant available service within the non-CONUS U.S. territories. Only in this way can we

ensure that natural market forces are allowed to provide the substantial benefits of very high speed broadband services to all regions and consumer groups in the world that are unserved or underserved by terrestrial distribution technologies.

Respectfully submitted,

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January 2, 2018